ANNEX 1:

ATHOS

USER MANUAL

Activity B6 - Training

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1. Executive summary

This document represents the *ATHena Ontology System* (*Athos*) User manual. It is intended to provide guidance to potential users and Knowledge Engineers that are in charge of the creation and of the maintenance of specific Reference Ontologies, to be used in activities, connected to the Projects, that are related to the development of Advanced Technologies for Interoperability of Heterogeneous Enterprise Networks and their Application, under the European project ATHENA.

Athos is a software tool developed by LEKS (Laboratory for Enterprise Knowledge and Systems), at IASI-CNR, for the definition and management of domain ontologies.

1.1 Restriction of use

Athos has been developed and released as a deliverable of the European ATHENA project A3, Knowledge Support and Semantic Mediation Solutions. The Athos tool is released for use by the authorized Athena project members for purposes linked to the Athena project objectives; any other use outside this project should be authorized by the Athena Project management.

1.2 Access to the system

Athos functionalities can be accessed, via a common web browser, at the address http://leks-pub.iasi.cnr.it/Athos. The browser must be enabled to accept cookies. Potential users must request in advance access rights to the Athos Administration Center by e-mail. to: dantonio@iasi.cnr.it.

1.3 Disclaimer

Athos is released as a prototype software within an advanced research program; LEKS, IASI-CNR cannot be held responsible for loss of data or information through potential malfunctions of the released software, even if great care has been taken in Athos development and testing.
LEKS, IASI-CNR welcomes any information and suggestions that may improve the system. Improvements and communications can be addressed to: dantonio@iasi.cnr.it.

2. Introduction

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The current document is the user guide of the **Athos** *(Athena Ontology System)*, a software tool developed by LEKS at IASI-CNR, for the definition and management of domain ontologies.

The current document is composed of the following chapters:

- the current Chapter 2 – Introduction: provides a brief introduction to the concepts of an Ontology, followed by the description of the modelling notions used by Athos and of the structure of the Athos user interface;
- Chapter 3 - Athos System: gives an outline of the Athos system, the different user profiles and the description of the Login-Logout procedures that allow the access to the selected Athos functionalities;
- Chapter 4 - Athos Interface Description: describes the functionalities and the panels that constitute a common structure of interaction and are available to all Athos profiles;
- Chapter 5 – Ontology User Functions: describes the functions and the panels that are intended for the normal User Profile;
- Chapter 6 - Ontology Master Functions: describes the functions and the panels that are reserved for the Ontology Master Profile;
- An Appendix that lists useful references to concepts related to Ontologies.

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2.1 Definition of an Ontology

An ontology represents a *shared understanding* of some domain of interest [Usch96]. It entails some sort of world view with respect to a given domain. It contains a set of concepts (e.g., representing entities, attributes, processes), together with their definitions and their inter-relationships; this is also referred to as a *conceptualisation*.

In other words, an ontology is an explicit, agreed specification about a shared conceptualisation. An ontology may have different degrees of formality but, necessarily, it includes a vocabulary of terms with their meaning (definitions) and their relationships.

According to [IDEF5], an ontology is a *domain vocabulary* containing a set of precise definitions, or *axioms*, that:

- provide the meaning of the terms,
- enable a consistent interpretation of the terms defined in the vocabulary.

2.2 The Athos metamodel

A metamodel is a set of modelling notions, definitions and rules that allows the definition of a conceptual model of a given domain. Therefore the metamodel allows one to specify which are the information to be provided and the rules to be followed during the definition of concepts that constitute an ontology.

The metamodel adopted in the Athos system is based on a subset of the OPAL methodology. For sake of conciseness, such a methodology will not be recalled here entirely; only a brief description of the OPAL modelling notions will be given in the following sections. A complete description of OPAL is the object of the Part 2 of this deliverable.

2.2.1 OPAL meta-concepts

According to **OPAL** (Object, Process, Actor modeling Language), an ontology is constructed by defining a set of concepts and establishing semantic relations among them. OPAL supplies a set of predefined concept categories (referred to as metaconcepts) and semantic relations that form the OPAL framework. The definition of a domain concept takes place by filling a concept template (conceived according to a frame-slot-facet approach), supplying first the OPAL category it belongs to, then the filling of the specified slots.

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The OPAL categories, also referred to as *kinds*, are classified as *Primary* and *Complementary*, according to the following prospect:

Primary Kinds:

- **Actor** : aimed at modelling any relevant entity of the domain that is able to activate or perform a process. (e.g. Buyer, Supplier);
- **Object**: aimed at modelling a passive entity, on which a process operates, typically to modify its state. (e.g., Purchase Order, Invoice);
- **Process**: aimed at modelling an activity that is performed by an actor to achieve a given goal. (e.g. Issuing Purchase Order, Sending Request for Quotation).

Complementary kinds:

- **Atomic Attribute** (*AA*): represents an elementary information, such as "street name";
- **Complex Attribute** (*CA*): is defined as an aggregation of lower level *CA* and/or *Atomic Attributes;*
- **Message**(*Msg*): describes the interaction between processes;
- **Business Object Document** (*BOD*): represents the content of a message.

Other complementary meta-concepts, based on conditionals (e.g., *State, Goal*), are used to complete the definition of Primary Concepts.

The OPAL concepts are connected by *conceptual relations*.

2.2.2 Athos concepts templates

The OPAL meta-model is used in the user interface of Athos to guide the Knowledge Engineer in the construction of an Ontology. In OPAL, a concept is specified according to a traditional Frame-Slot-Facet modeling paradigm. In particular, there is a frame structure (template) for each concept category. OPAL templates are used in the interface of Athos to allow the user to introduce domain concepts in the ontology.

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To show its structure an example of "template for Business Concepts" is shown in Fig.1.

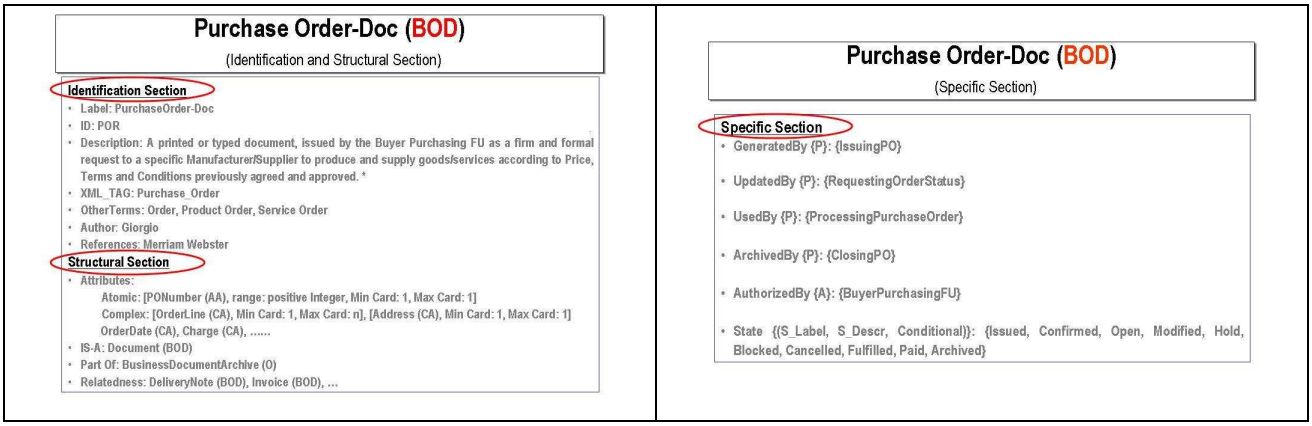
Purchase Order-Doc (BOD)
(Identification and Structural Section)
Identification Section
Label: PurchaseOrder-Doc
ID: POR
Description: A printed or typed document, issued by the Buyer Purchasing FU as a firm and formal request to a specific Manufacturer/Supplier to produce and supply goods/services according to Price, Terms and Conditions previously agreed and approved. *
XML_TAG: Purchase_Order
OtherTerms: Order, Product Order, Service Order
Author: Giorgio
References: Merriam Webster
Structural Section
Attributes:
Atomic: [PONumber (AA), range: positive Integer, Min Card: 1, Max Card: 1]
Complex: [OrderLine (CA), Min Card: 1, Max Card: n], [Address (CA), Min Card: 1, Max Card: 1]
OrderDate (CA), Charge (CA), ...
IS-A: Document (BOD)
Part Of: BusinessDocumentArchive (0)
Relatedness: DeliveryNote (BOD), Invoice (BOD), ...
Purchase Order-Doc (BOD)
(Specific Section)
Specific Section
GeneratedBy {P}: {IssuingPO}
UpdatedBy {P}: {RequestingOrderStatus}
UsedBy {P}: {ProcessingPurchaseOrder}
ArchivedBy {P}: {ClosingPO}
AuthorizedBy {A}: {BuyerPurchasingFU}
State {{S_Label, S_Descr, Conditional}}: {Issued, Confirmed, Open, Modified, Hold, Blocked, Cancelled, Fulfilled, Paid, Archived}

Fig. 1 – Athos Template structure: a Business Object Document example

An Athos template is organised in three sections:

- *Identification Section*;
- *Structural Section*;
- *Specific Section*.

The first two sections are the same for all the three templates, while the third section is designed specifically for each template, with the aim to represent domain specific links and dependencies

2.2.3 *Identification Section*

It contains an intuitive and textual description of the concept, plus a number of meta-information fields:

- **Label**: the preferred term to refer the concept**Description**: natural language description
- **XMLTag**: a tag that can be used to refer to the concept in a XML document**Terminology**: synonyms of the preferred terms**Author**: who defined the concept
- **References**: documental sources used for the concept definition

2.2.4 *Structural Section*

It contains:

- **Attributes:** they are classified as:
  - Atomic Attributes [AA]: elementary data properties;

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    - Complex Attribute [CA]: structured data properties.
- **Hierarchies:**
    - **ISA:** concepts specialization (e.g., an invoice is a *business_document*)
    - **Part of:** concepts decomposition (e.g., a *department* is part of an *enterprise*)
- **Relatedness***:* domain specific relationship between concepts (e.g., the *invoice* is related to the *customer*)

2.2.5 *Specific Section*

While the first two sections are the same for each concept kind, the *Specific Section* is different from one concept to another. Furthermore, while in the *Structural Section* the user is free to define all the elements required to specify a concept, in the *Specific Section* the elements to be filled are predefined and the user can not modify the given structure.

The features of the *Specific Section* for each concept category (kind) are the following:

Object *Specific Section*

An Object has a *Specific Section* that reports the following information:

- *GeneratedBy*, *UpdatedBy*, *UsedBy*, *ArchivedBy*: the Processes that create, manipulate, archive the Object;
- *States*, labelled boolean expressions over the Object attributes or those of related concepts

Process *Specific Section*

The relations that are part of the *Specific Section* of the Process template are:

- *Creates*, *Updates*, *Enquires* and *Archives Business Objects*: the business objects that are directly accessed or manipulated by the Process;
- *In*, *Out* and *Fault Messages*: the incoming, outgoing messages of the Process. The Fault messages: allow to model the exceptions handling;
- *Actors*: the actors that are requested for the execution of the Process;
- *EstimatedTime*: the estimation of the Process execution time.

Actor *Specific Section*

The relations that are specified in the *Specific Section* of the Actor are:

- *Goals*, objectives that must be accomplished by the Actor, in the form of an OCL expression (e.g., salaries should be less that 60% of deprtment budget)

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- *Skills*, indicating the actions it is able to perform or monitor (i.e., list of processes and/or operations)
- *Responsibilities*, the processes in which the Actor is involved, in achieving a Goal (as above), with his/her/its respective role (i.e., performer, controller, stakeholder, supporter), and the Objects he/she/it can manage;
- *Collaborations*, the other actors involved in the performed activities.

Message *Specific Section*

A Message (M) is here considered as a particular case of Business Object. Assuming that, the Message templates is a specialization of the Object template. It means that all the features of the Object template are in the Message template, and at the same time in the Message template we have some more characteristics.

The relations that are part of the *Specific Section* of the Message template are:

- *Source*, the Actors who send the message;
- *Destination*, the Actors who receive the message;
- *Content*, the Business Object Document that is carried by the Message;
- *PrecedingMessages*, the set of Messages that can precede a given Message in the iteraction between two Processes
- *FollowingMessages*, the set of Messages that can precede a given Message
- *PreCondition*, a boolean expression that must be true in order to allow the sending of the Message.

Business Object Document *Specific Section*

Like the Message template, also the Business Object Document (BOD) template is here considered as a particular case of Business Object and then considered as a specialization of the Object template.

The relations that are specifically part of the *Specific Section* of the BOD template are:

- *AuthoredBy*, the Actors who can be identified as the authors of the BOD;
- *CarriedBy*, the Messages that can carry the BOD as their actual content.

Atomic Attribute *Specific Section*

The features of the *Specific Section* of the Atomic Attribute template are:

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- *Domain*, the set of concepts for which a predication with the Attribute can be established. Please, note that, if this property is valued with a list of concepts, the domain must be interpreted as the union of the set of instances of the specified concepts;
- *Range*, the basic type of the attribute. Possible values are: 'int', 'real', 'string';
- *Functional*, boolean value that says if for each instance of the Domain there is at most one instance of the Attribute (if more than one, then they represent the same object);
- *InverseFunctional*, boolean value that says if for each instance of the Range there is at most one instance of the Domain.

Complex Attribute *Specific Section*

– The features of the *Specific Section* of the Complex Attribute template are:

- *Domain*, the set of concepts for which a predication with the Attribute can be established;
- *Functional*, boolean value that says if for each instance of the Domain there is at most one instance of the Attribute (if more than one they represent the same);
- *InverseFunctional*, boolean value that says if for each instance of the Range there is at most one instance of the Domain.

2.3 Athos concepts references and use

2.3.1 Concepts list

The process of ontology generation requires an initial definition of the ontology *domain vocabulary;* this process is performed in Athos with the identification of the ontology concepts into a "concepts list", that contains two basic definitions:

- **LABEL**: a term that denotes the concept (mandatory);
- **KIND**: the category to which the concept belongs.

The couple formed by **the label and the kind** of any concept must be unique (mandatory).

2.3.2 Pending list

The listed concepts are "fixed" or "pending" with reference to the process that has created them. In addition to the terms referring to concepts specified in the ontology there are some terms named

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Pending terms. During its definition, a concept can be associated through any of the above relations, to concepts not yet defined. Such concepts will be referred as Pending terms.

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3. The Athos System

The **Athos** software system has been developed by LEKS, IASI-CNR within the Athena Project, to support the definition and management of domain ontologies. Its main characteristics are described in the following paragraphs.

3.1 Generality

The creation of an ontology in Athos is performed by filling forms organised in accordance with the OPAL meta-model briefl. The system is accessible via a web browser (in the first version only through Internet Explorer). All the ontology functions, such as concept specification and updating, concept reading, system management, an, and administration, can be performed remotely.

The Athos system server, with the ontology repository, is centrally managed by an "Administration Team", dedicated to accomplish all the activities for the Athos system maintenance and use.

3.2 Athos User categories

Athos is an ontology management system capable of managing several ontologies. The access to an ontology is regulated defining groups and users, with different access privileges.

In order to have a controlled access to each defined ontology, the "Athos Administration Team" grants the access to each ontology, through appropriate procedures (see also the "Athos Administration Service" and the "Accept ties" to use the system).

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The Athos Administrator manages, in agreement with the responsible of the ontology (the Ontology Master, see below):

- access authorizations: on request assigning a user ID and a password;
- different access levels: two access rights levels have been identified, that correspond to the following user's profiles:
  - **Ontology User;**
  - **Ontology Master;**
- organisation of users in groups (**User Groups)**;
- access restriction through the use of passwords;
- access monitoring through a log file.

An additional profile, as previously said, is represented by the **Athos Administrator,** who may create new accounts, remove or modify existing accounts and defines the types of access rights to be granted to a specific user. To perform these activities the Athos Administrator works in conjunction with the **User's Organizations.** In particular with the **Ontology Master** for the domain of interest of the ontology, in order to check and endorse the user and group organization.

3.3 Ontology users and group organisation

Ontology Users and **Ontology Masters** are organised into **User Groups**, each of which is associated with the set of ontologies they can access. The privileges of the **Ontology Users** are restricted to the browsing of ontologies, while the **Ontology Masters** can use all the facilities that Athos supplies.
The **Ontology Masters** are the responsible of the management of an ontology.

Each user may belong to different **User Groups** and logs in an ontology by using a *user ID* and a personal *password.* All the access rights of the **Ontology User** are extended to the **Ontology Master**.

In particular:

- the **Ontology User** can access and browse the ontology, but cannot modify its content.
- The **Ontology Master** has the possibility of using all Athos facilities to create concepts or to modify existing concepts.

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In this user guide, the user access rights will be described incrementally, starting from the level granted to an **Ontology User**, to the access level granted to an **Ontology Master**.

3.4 Athos Login

The Athos system is accessible via the Internet at the address http://leks-pub.iasi.cnr.it/Athos.
After connection with the Athos home-page, the **Athos Login** window appears (Figure 2.), allowing the user to access to **Athos** by filling:

- the **User Name** field: with the user ID assigned by the Administrator;
- the **Password** field: the related password assigned by the Administrator.

.

Figure 2 –Login window

(Format and Language into the window is browser dependent).

The **OK** button allows the user to submit the inserted data and, if correctly identified, to enter.
If user name or password are wrong, the following **Unidentified user** message appears:

"You are not authorized to access this resource"

The Athos users are organised into User Groups, each of which has access to predefined ontologies. Each user can only access the ontologies created within the User Groups he/she belongs to. The same ontology can be made available to different User Groups. Furthermore, the same user can access different ontologies with the same or a different user access rights.

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The system opens the Ontology Login page shown in the Figure 3 with one or more environments, identified as user access rights. According to the combination of the selected User Group and the specific ontology, the system is able to recognise the access level (the category) of the user.
Depending on the user category, Athos allows the access to different ontology environments.

A click on the ontology name allows the user to reach the desired **Ontology environment** required.

Login Page
(Athos requires Internet Explorer 6 or later and cookies enabled)
You are logged as
You can access the following ontologies :
TestOntology : A test ontology

Figure 3 – Login page

3.5 Athos Logout

In order to disconnect (log out) a user from a given ontology, a user has just to close the browser window.

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4. The Athos Interface description

When a user connects to a specific ontology, the system opens a working environment. Athos has two main environments corresponding to the two user categories introduced in the previous section:

- **Ontology User**,
- **Ontology Master.**

They differ among them for the enabled functionalities.

As anticipated, the **Ontology Master environment** enables all the **Ontology User environment** functionalities and some additional ones. For this reason the user interfaces of the different environments will be presented incrementally, starting from the first screen that appears after login, as shown in Fig.4.

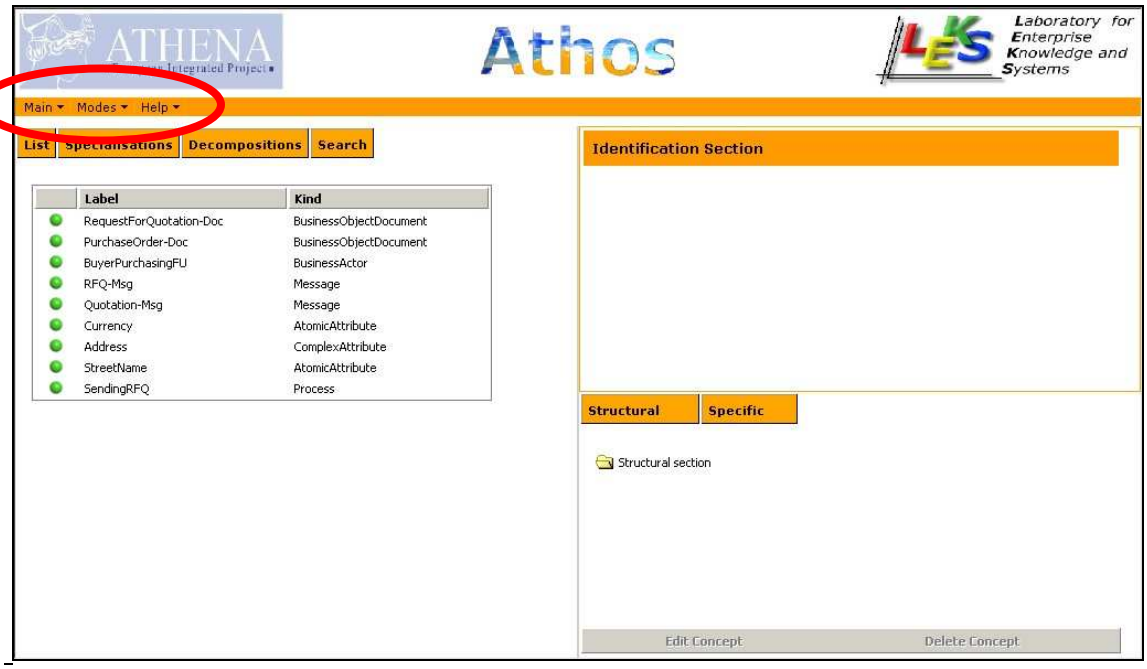

Figure 4 – The Athos standard interface - Menu bar

4.1 The Menu Bar

The Menu Bar is indicated in Fig.4; it is composed of three buttons; (each element is active only if the user has the enabled functionalities to use it) The three buttons are:

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- **Main:** activates the operations that the user can perform on the ontology:
- **Modes:** defines the basic modalities in which it is possible to use the tool; they are:
  - **Glossary Mode;**
  - **Ontology mode**:
- **Help:** that allows the user to access to the Athos guide

4.2 The Navigation Bar

The Navigation Bar is highlighted in Fig.5

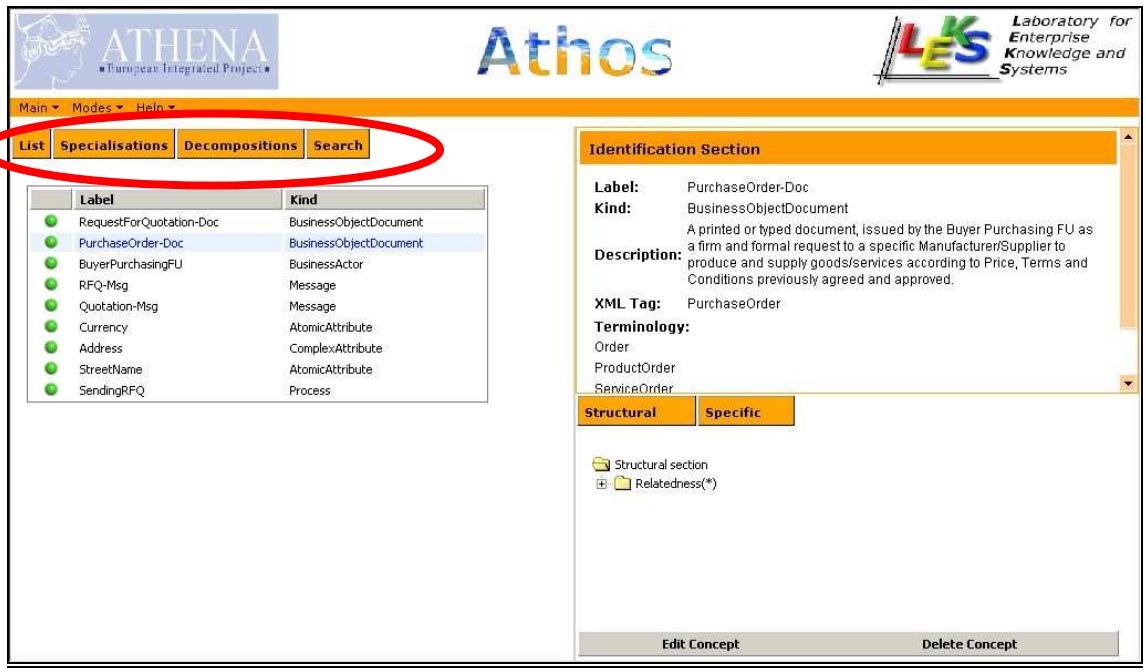

Figure 5 – The Athos standard interface - Navigation bar

The Navigation Bar is indicated in Fig. 5; it is composed by four buttons that activate the display of different panels related to the functions:

- **List:** activates the list panel of the ontology concepts;
- **Specialisations:** activates the specialisation functional panel;
- **Decompositions:** activates the decomposition functional panel;
- **Search:** activates the search functional panel.

A detailed description of the above functions is provided in the following paragraphs.

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4.3 The Concept List panel

The concept list panel is highlighted in Fig.6

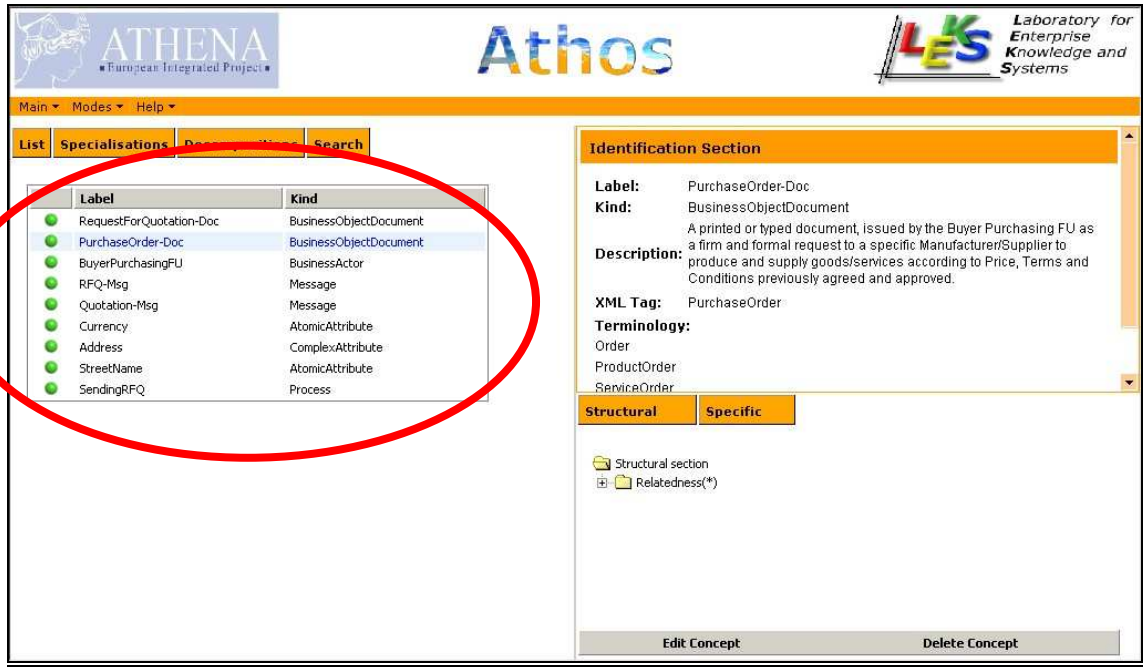

Figure 6 – The Athos standard interface – Concept List

The **Concept List** panel shows the list of all the concepts of the selected ontology, in alphabetic order. Each concept is represented by its *Label* and *Kind*. In addition each item has a green/red indicator that show the concept status (fully defined concepts = green or pending terms = red).

The Concept List can be shown in two more fashions:

- **Specializations mode**: activated through the *Specialisations* button on the navigation bar allows concepts to be presented organized according to a specialization hierarchy.
- **Decompositions mode**: activated through the *Decompositions* button on the navigation bar This button allows concepts to be presented organized according to a decomposition hierarchy.

The function associated to the **Search** button are described later in chapter 5.4.

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4.4 The Identification Section panel

The *Identification Section* panel is highlighted in Fig. 7

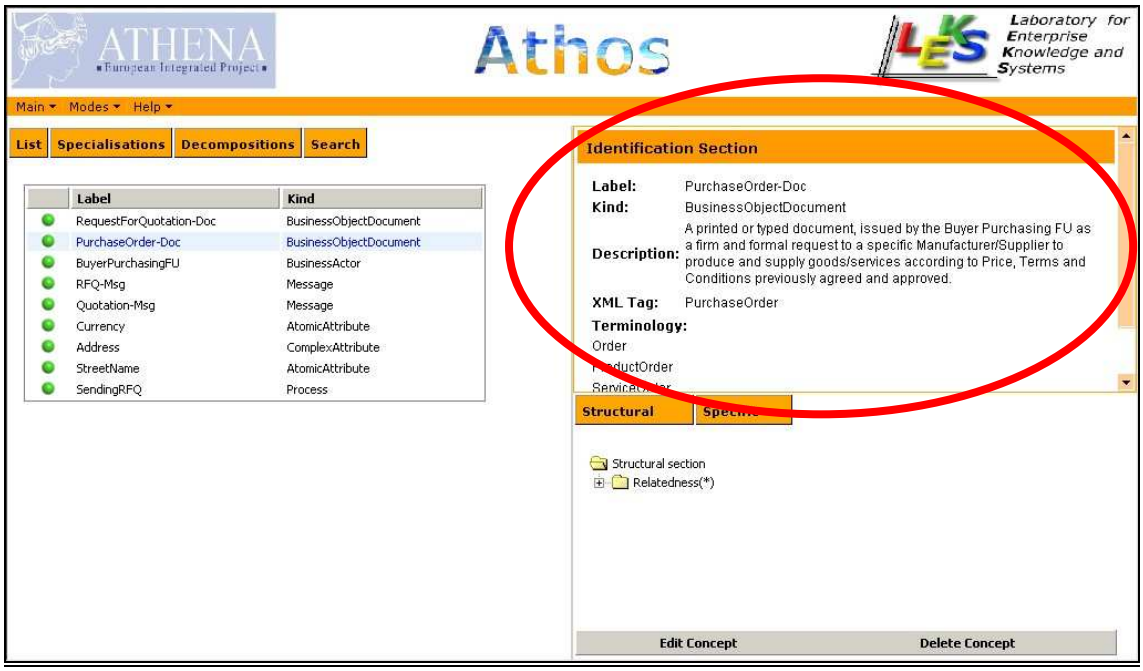

Figure 7 – The Athos standard interface – *Identification Section*

The ***Identification Section*** displays the meta-data of the concept selected from the concept list.

Two buttons **Edit Concept** and **Delete Concept,** located at the bottom of the Structural panel**,** allow the user (**these options are reserved to the Ontology Master**) to perform Edit or Delete operations on a concept, selected in the list. Additional details of this functions are described later into the Master environment section (Chapter 5).

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4.5 The Structural Section panel

The *Structural Section* panel is highlighted in Fig. 8

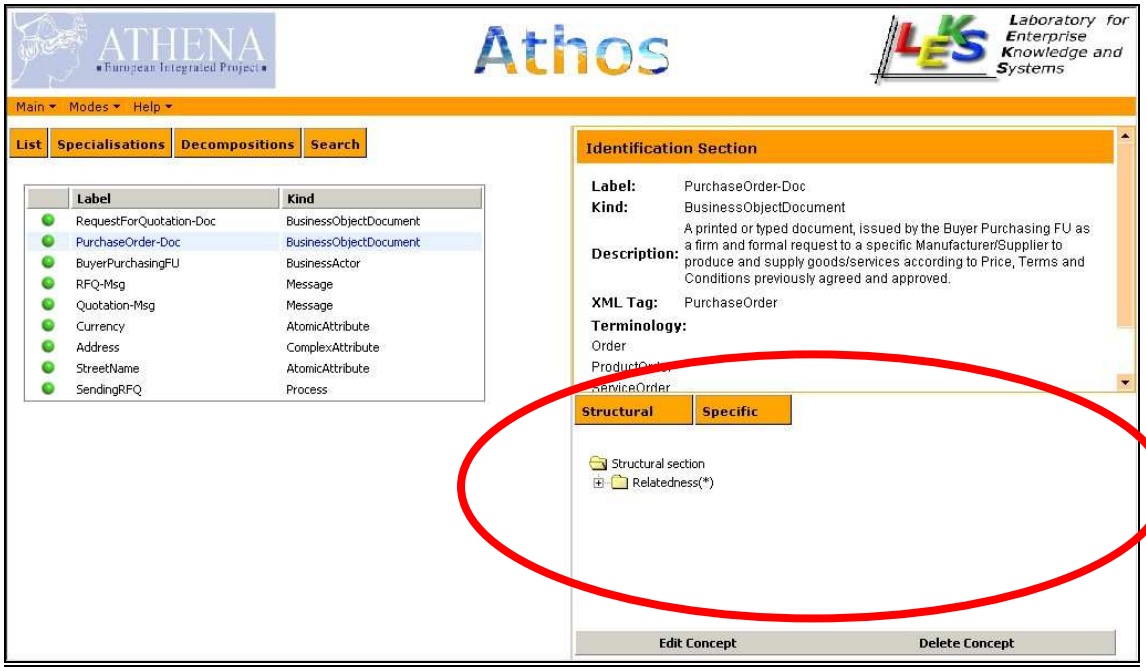

Figure 8 – The Athos standard interface – Structural/*Specific Section*

Below the *Identification Section* panel, the *Structural Section* button and the *Specific Section* button, allow to show, in an additional panel, respectively the *Structural Section* and the *Specific Section*.

Additional details about the content of the *Structural Section* are given in Chapter 4

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5. Ontology User Functions

When an Ontology User enters in the Ontology User environment, the Menu bar functions are activated, the Navigation bar functions are activated and the List panel shows the Concepts of the accessed ontology (in Label alphabetical order). The panels regarding the *Identification Section*, the *Structural Section* and the *Specific Section Section* are empty (see Fig. 9).

Figure 9 – The Ontology User Environment – Default display

As already mentioned, the Ontology User environment allows the Ontology User to inspect the ontology. The user, through the List function can:

1. select the modality of list display (by double clicking on the **Label** or **Kind** button);
2. scroll the concept list:
3. select a concept (by clicking with the left button on the mouse); the concept line will be highlighted;
4. View the corresponding concept details through the Identification Section, Structural and Specific Sections.

5.1 Display a concept

To display a concept of the ontology, a User has to select a concept from the Concept List, in the left section, with a click on the row.

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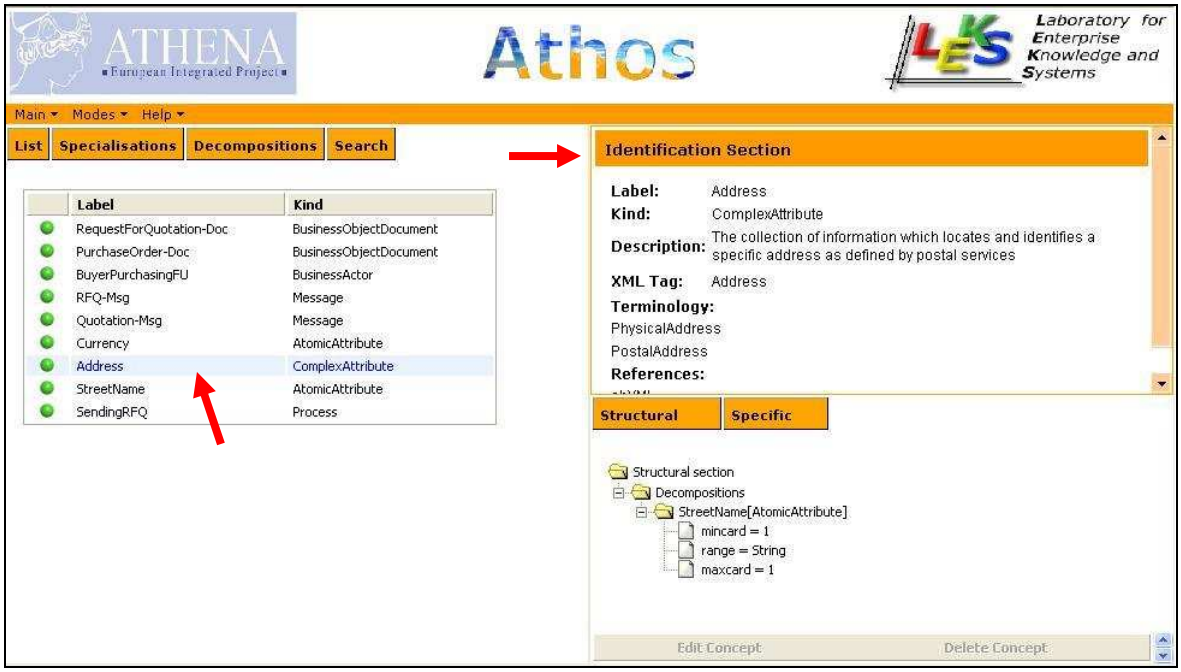

Figure 10 – Display a concept: *Identification Section*

In the Figure 10 the concept *Address* has been selected. These operations display the content of the concept in the panels on the right.

5.1.1 The *Identification Section*

The *Identification Section* panel shows the main information about the selected concept, that are:

Label, **Kind**, **Description**, **XML Tag, Terminology** and **References**

as described into the introduction section of this manual.

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5.1.2 The *Structural Section*

The *Structural Section* panel is highlighted in Fig.11.

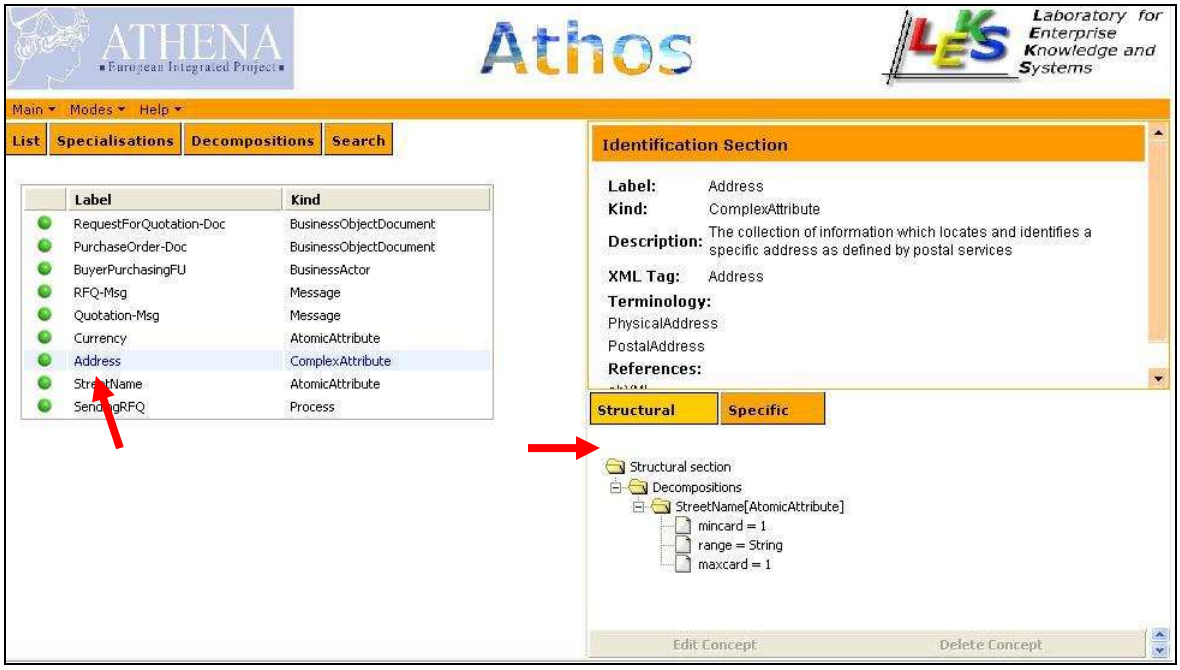

Figure 11 – Display a concept: *Structural Section*

The *Structural Section* of the selected concept is presented according to a tree structure that can be expanded, similarly to a Windows folder tree.

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5.1.3 The *Specific Section*

The *Specific Section* panel is highlighted in Fig.12.

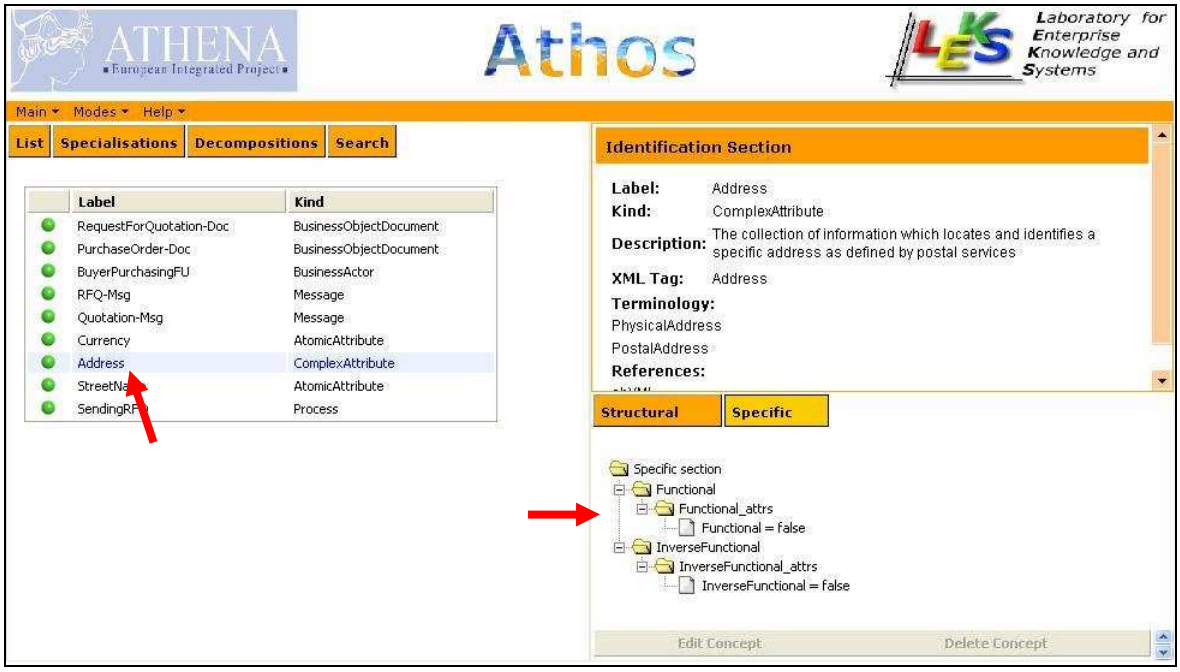

Figure 12 – Display a concept: *Specific Section*

The *Specific Section* of the selected concept is also presented according to a tree structure that can be expanded, similarly to a Windows folder tree.

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5.2 Display a concept specialisation hierarchies

To display a concept specialisation hierarchy of the ontology, a User has to click on the **Specialisations** button of the Navigation menu bar. The user selects a concept from the specialisation hierarchy, by clicking on the row with the left button of the mouse. The concept details are displayed in the *Identification Section* (Fig. 13).

Figure 13 – Display the specialisation hierarchy

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5.3 Display a concept decomposition hierarchies

To display a concept decomposition hierarchy of the ontology, a User has to click on the **Decompositions** button of the Navigation menu bar. The user selects a concept from the decomposition hierarchy, by clicking on the row with the left button of the mouse. The concept details are displayed in the *Identification Section* (Fig.14).

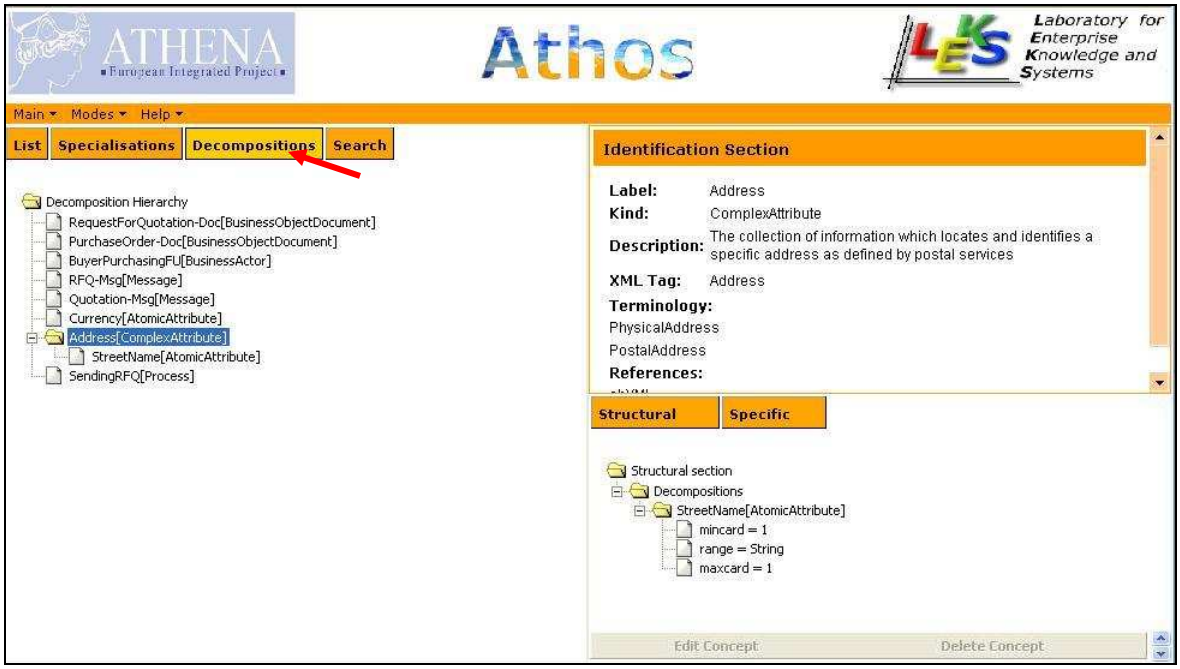

Figure 14 – Display the decomposition hierarchy

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5.4 The search function

5.4.1 The search function activation

In order to search concept(s) in the Ontology, a user has to click on the **Search** button of the Navigation bar; this action activates the **Search** panel (Figure 15).

Figure 15 – The Search function

The Search panel shows two fields :

- the **Search by** field**:** this is a pull-down menu that defines the concept search criteria;
- the **Value** field: is used to insert the search keyword.

The **Value** field accepts a value freely specified by the user. The **Search** button activates the process.

The output of the search operation is shown in a list displayed below the search button (Figure 16).

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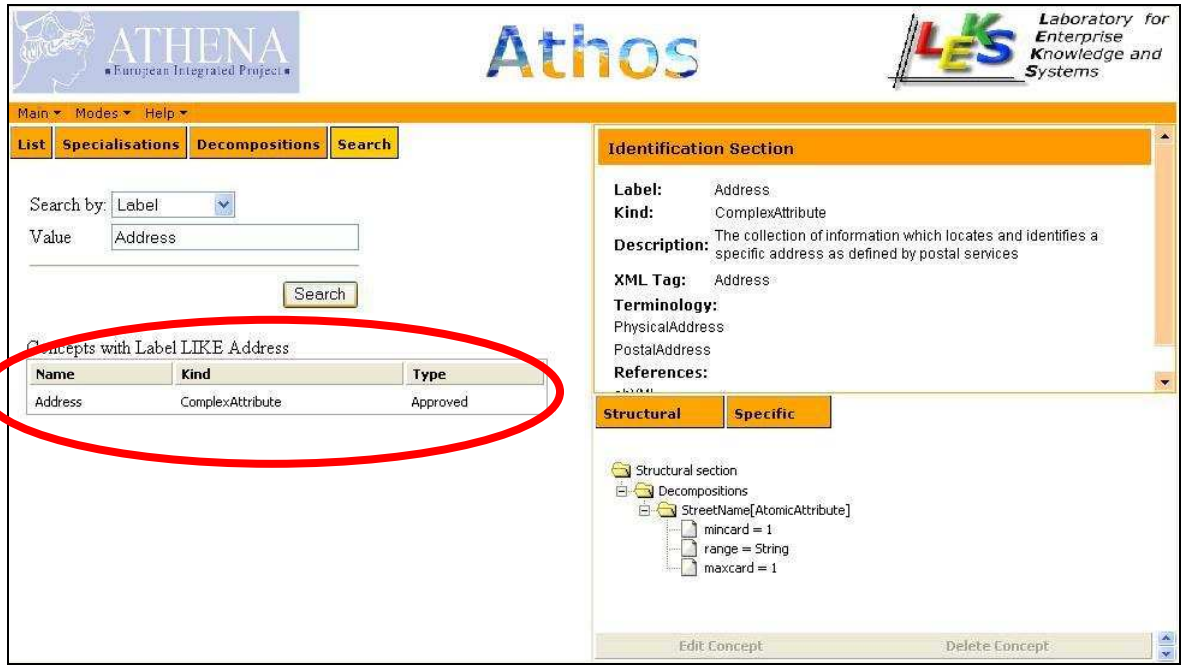

Figure 16 – The Search Result

If more than one concept is found , the selection of one displays its details in the *Identification Section* panel at the right of the screen.

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5.5 The glossary mode function

5.5.1 Glossary mode

The normal Athos modality of operation is in Ontology Mode; The **Modes** button on the Main Menu bar allows the User to operate in **Glossary Mode,** by selecting the option **Glossary Mode** into the banner (see Fig.17).

When this operation mode is activated the *Identification Section* panel is expanded to allow the full display of all information related to the concept that can be selected by a mouse click on the concept list panel. This mode of operation is particularly useful when new concepts for a specific reference ontology are collected and evaluated.

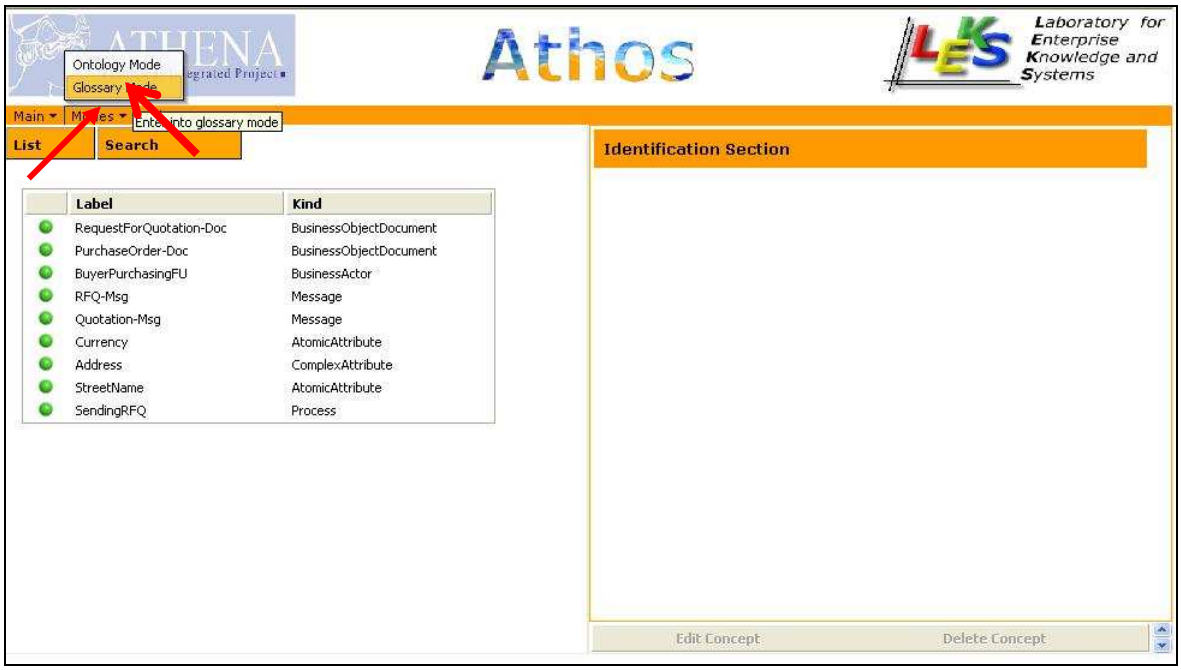

Figure 17 – The Glossary display

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5.5.2 Export glossary function

In the Athos system User has the option to export a Glossary from the *Concepts List*. This option is related to the list in the left section; to this end he/she has to click on the **Menu bar** the **Main button,** selecting the option **Export Glossary** into the banner (Fig. 18).

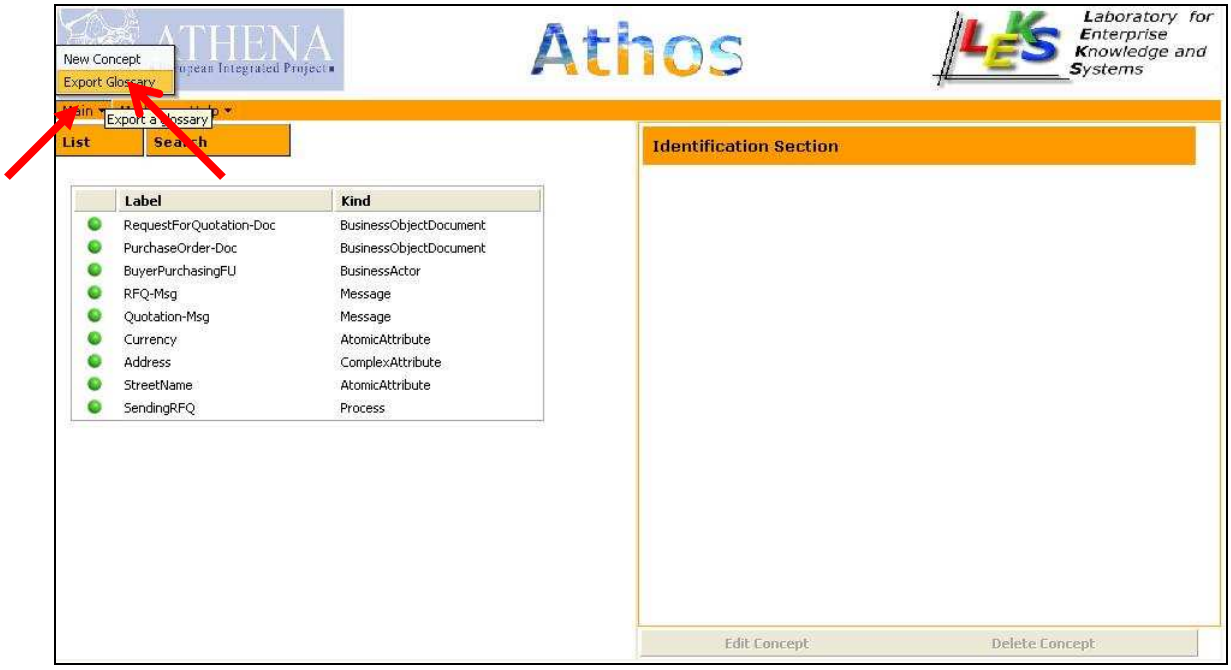

Figure 18 – Export Glossary function

The result is a Glossary page organized as follows, like a print page form. Please note that each concept may have more than one Description. The Kind of a concept is reported in square brackets.

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Label	Description
Address *[ComplexAttribute]*	The collection of information which locates and identifies a specific address as defined by postal services.
BuyerPurchasingFU *[BusinessActor]*	All the individuals and units that participate in the business buying process for an organization.
Currency *[AtomicAttribute]*	• Monetary entity usually issued by the national government that are used as money. Metal coins are also frequently included under the generic heading of currency. • The currency of money. (Uses values from ISO 4217). • Currency used in the payment.
PurchaseOrder-Doc *[BusinessObjectDocument]*	A printed or typed document, issued by the Buyer Purchasing FU as a firm and formal request to a specific Manufacturer/Supplier to produce and supply goods/services according to Price, Terms and Conditions previously agreed and approved.
Quotation-Msg *[Message]*	The message used by the Supplier to send the Quotation to the Buyer.
RFQ-Msg *[Message]*	The message used by the Buyer to send the RFQ-Doc to the Supplier.
RequestForQuotation-Doc *[BusinessObjectDocument]*	A bid document used to solicit quotations from prospective sellers of products or services.
SendingRFQ *[Process]*	Process of requesting a quotation to external suppliers or manufacturers in front of specific needs and quantities of goods and services.
StreetName *[AtomicAttribute]*	The name of a street or thoroughfare.

Figure 19 Glossary List

5.6 Print a concept

Athos system provides the option to save, copy or print a concept, offering to the users to do these actions via the browser options.

To print a concept, for example, a user must:

- select a concept from the *Concepts List*;
- chose the *Identification Section* sub-area (via mouse) he/she like to print,
- click the right side button on the mouse to open the browser menu with the options,
- chose **Print** option and activate it.

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6. The Ontology Master Functions

The **Ontology Master**, with respect to the **Ontology User**, is also enabled to modify the ontology content. Similarly to the **Ontology User environment**, the **Ontology Master environment** allows to View or Search concepts**.**

In addition the **Ontology Master environment** allows an **Ontology Manager** to:

- Create a new concept;
- Edit an existing concept;
- Delete an existing concept.

In the **Ontology Master environment** the **Main** button offers the **New Concept** option (see Fig.20).

Tthe **Edit Concept** and the **Delete Concept** buttons **are enabled** to enabling editing and deleting operations on concepts.

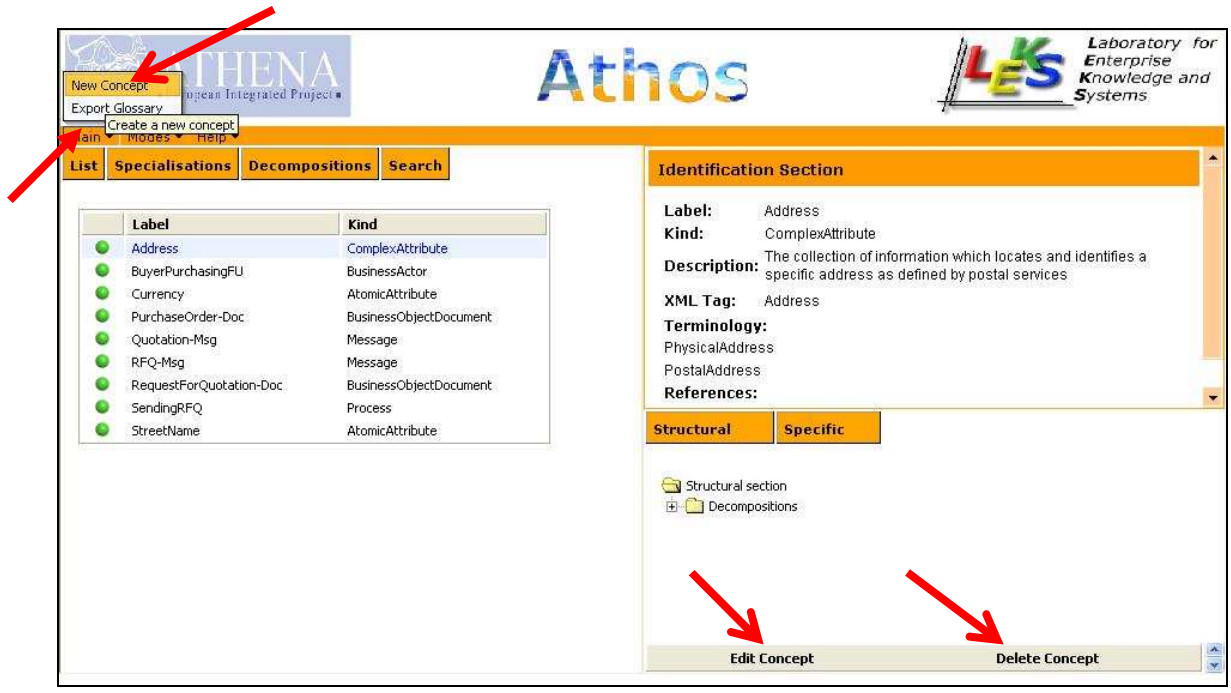

Figure 20 – The Ontology Master environment

Since the View and Search functions are the same as in the Ontology User environment, in the following sections, only the additional functions will be described. To see how to View or Search a concept, see the Chapter 5 - ***The Ontology User environment*** of this manual.

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6.1 Create a new concept

To create a new concept, an **Ontology Master** has to click on the **Main** button in the Menu bar and choose to click the **New Concept** tab. This operation opens the ***Identification Section*** **Form** in a popup window (Fig 21 – upper and lower working area). The window has:

- **on the top**: a menu bar with the buttons ***Identification Section***, ***Structural Section***, ***Specific Section*** to select one or another of the three available sections required to completely define a new concept (Identification, Structural, Specific).
- **inside** the window, depending on the selected buttons on the top, one of the three different forms, corresponding to one of the concept sections, with fields and buttons to correctly insert the requested information. By default the form related to the *Identification Section* is initially displayed

6.1.1 Input of the *Identification Section*

Starting from the ***Identification Section*****,** that is normally the first one to be filled, we see the fields (with self-explanatory labels) that represent the required information for the *Identification Section* of a concept (see the Introduction - Athos concepts organization).

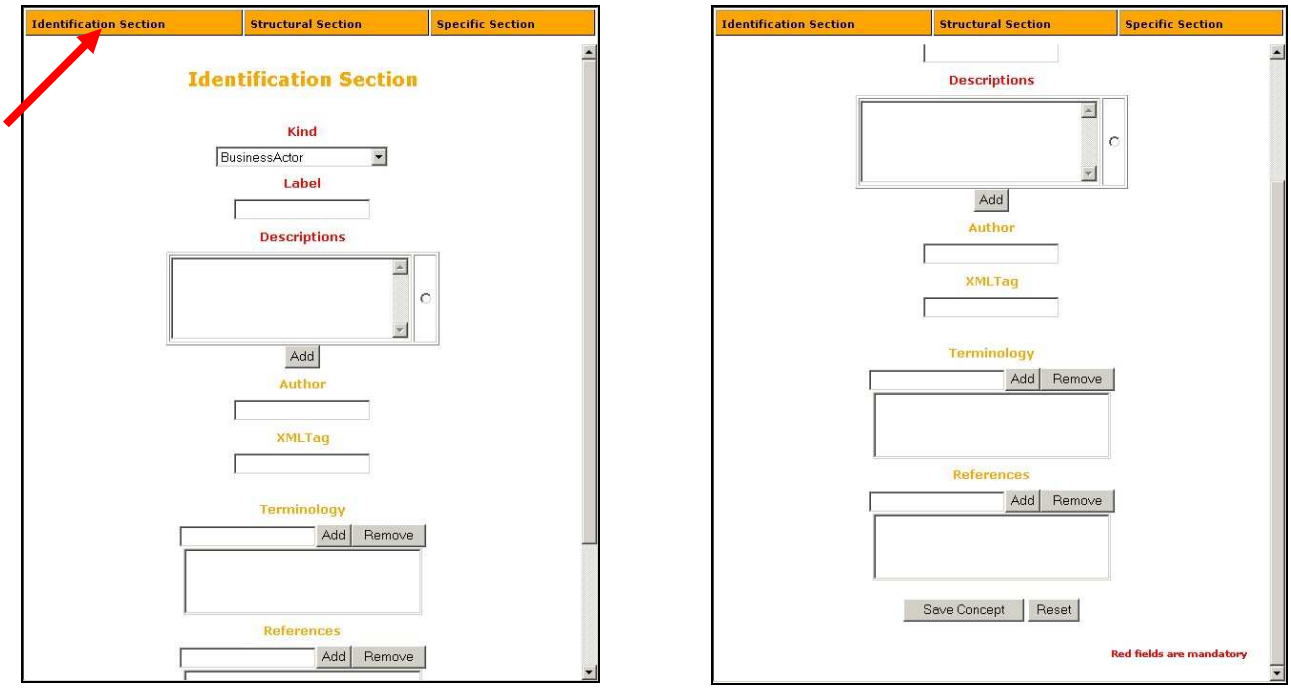

Figure 21 – Creation of a new concept - The *Identification Section*

The Kind, Label and Description fields are three **mandatory** fields for the definition of a concept.

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Clicking on the "Kind" (Fig 21 - left) field, a pull down menu with the concept kinds proposed by the OPAL methodology is displayed. By selecting a row the Ontology Master can choose a specific kind for the *New Concept* he/she is going to create.

After the kind selection, the Ontology Master has to fill, with appropriate data, the fields **Label** and **Description**, (Required fields), while the other fields, **Author, XML Tag**, **Terminology** and **Reference,** can be omitted. All fields, during the creation cycle, can be rewritten to change the content, before saving the new concept.

The fields in which the Ontology Master may insert more than one statement (Terminology and Reference **-** Fig 21 - right), accept (and show just under the insert area) more than an input; each additional input can be inserted via the **Add** button. Each statement into these two windows may be removed, by selecting it with a click on the row and then clicking the **Remove** button.

At the end of the data insertion on this panel the Master may:

- click on the **Save Concept** button (Fig 21 - right) to save the new concept containing only the inserted definitions already built on ;
- click on the **Reset** button to reset all the work done;
- click on one of the **Top bar** buttons, to select another pop-up window (either *Structural Section* or *Specific Section*) to add other inputs to the new concept.

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6.1.2 Input of the *Structural Section*

The ***Structural Section*,** (normally the second one that the Ontology Master fills), is activated as a pop-up panel into the same window panel in which the *Identification Section* was displayed; the panel contains buttons and fields to insert the data required to fill the Structural template of the new concept. (Fig 22, left for upper and right for lower area).

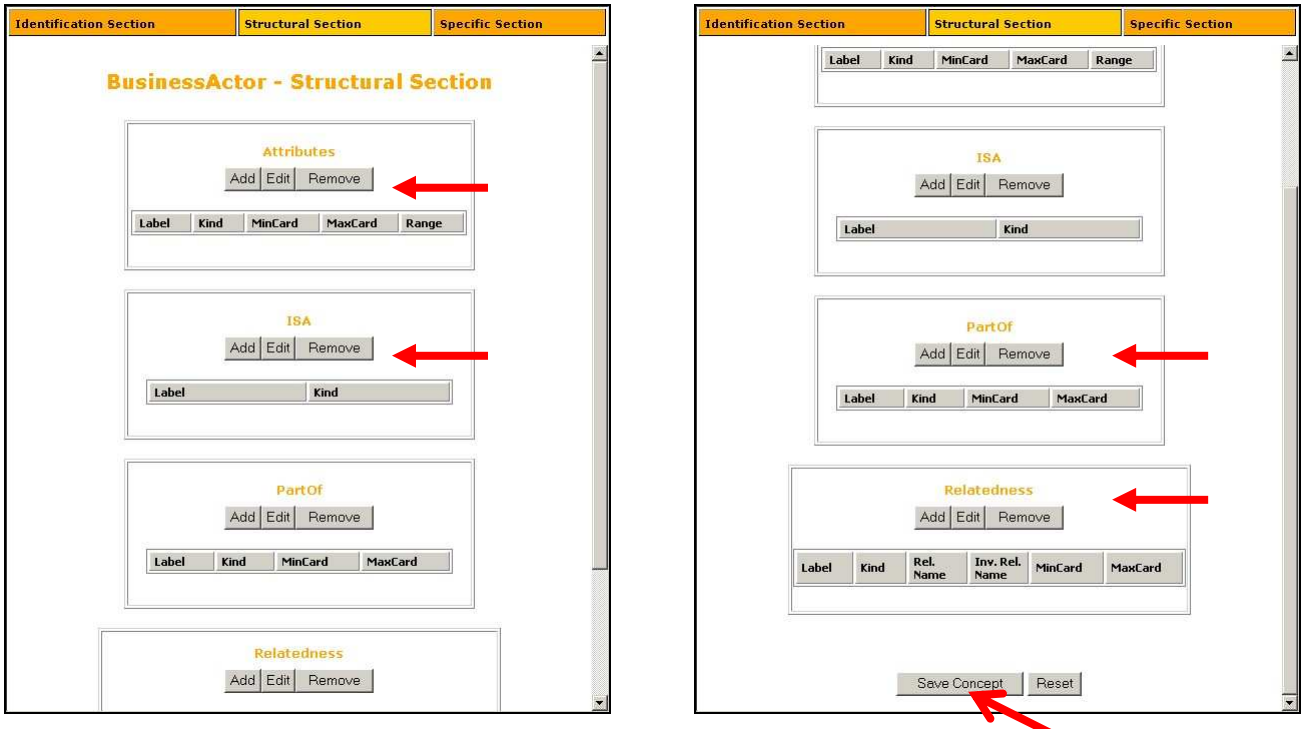

Figure 22 – Creation of a new concept - The *Structural Section*

Each field (with self-explaining identification labels and target buttons) may be used to define the information linked to the new concept (see the Introduction - Athos concepts organization). In particular it is possible to **Add** (but also to edit or remove, because the same panel is used for edit and remove functions, as later explained) Attributes, Hierarchies, Relatedness.

Depending on the kind of concept to be specified, the interface presents different windows to be filled.

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In Fig.23 below the attributes of *a* new *Business Actor* are inserted. Opening the corresponding *Structural Section*, the Attributes window will be active. Clicking the **Add** button (Figure 23 – left – *Structural Section*), a popup sub- panel will be opened (Figure 23 – right).

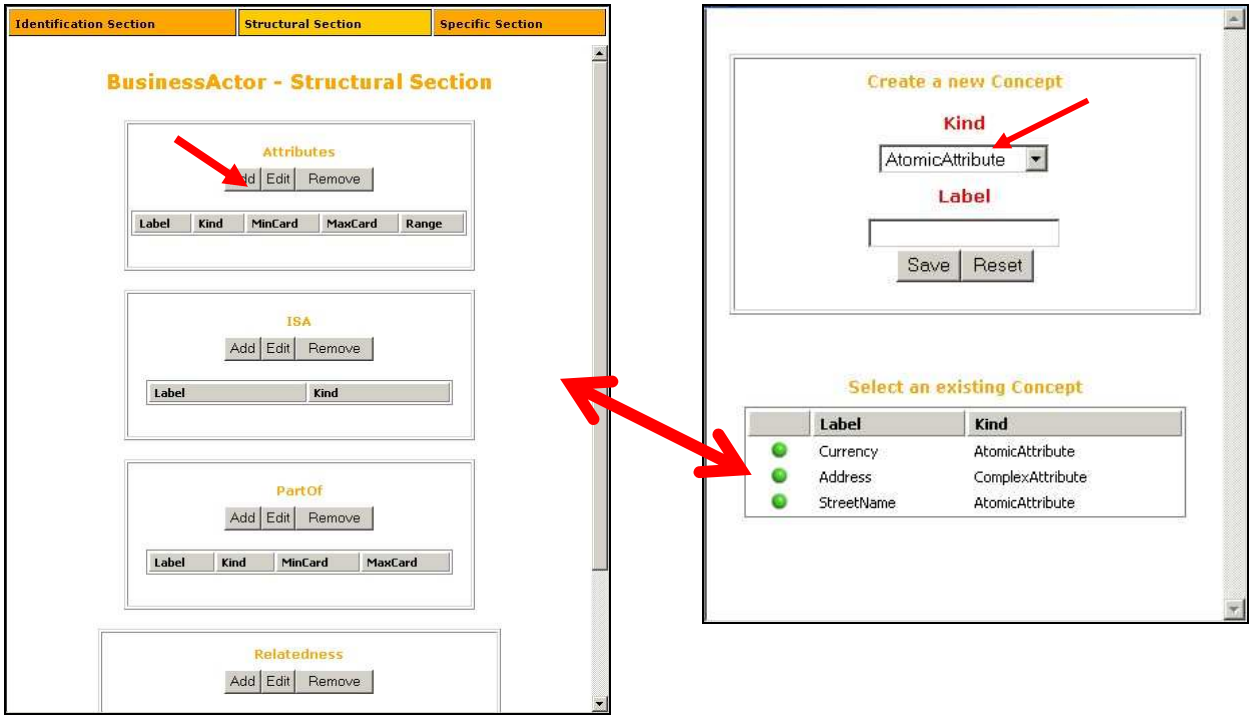

Figure 23 – Creation of a new concept - Attribute addition

In the popup sub-panel it is possible to enter a new concept (if it is not yet defined, this concept is considered as a Pending concept and becomes part of the **Pending list),** or to select an existing concept from the concept list, and link it to the new concept. Such a concept must be, in this case, an *Atomic Attributes [AA]* (or elementary data property) or *Complex Attribute [CA]* (structured data properties) that are the only two kind of concepts linkable like "attribute" to *a new Business Object.*

As will be shown later with an example, the action performed on this panel will generate information, to be written into the "Attributes window".

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The same process is available for all the other data that is possible to manage via this panel. At the end of the data insertion on this panel the Ontology Master may:

- click on the **Save Concept** button to save the new concept containing only the inserted definitions already built on (in case of a future editing to add further information);
- click on the **Reset** button to reset all the work done;
- click on one of the **Top bar** buttons, to select another pop-up window (either Identification or Specific) to add other inputs to the new concept.

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6.1.3 Input of the *Specific Section*

The ***Specific Section*,** that is normally the third one the Master fills, appears into the same popup panel in which the Identification and *Structural Section* were and show buttons and fields to insert the data to compose the Structural tree of the new concept (Fig 24, left for up and right for down area).

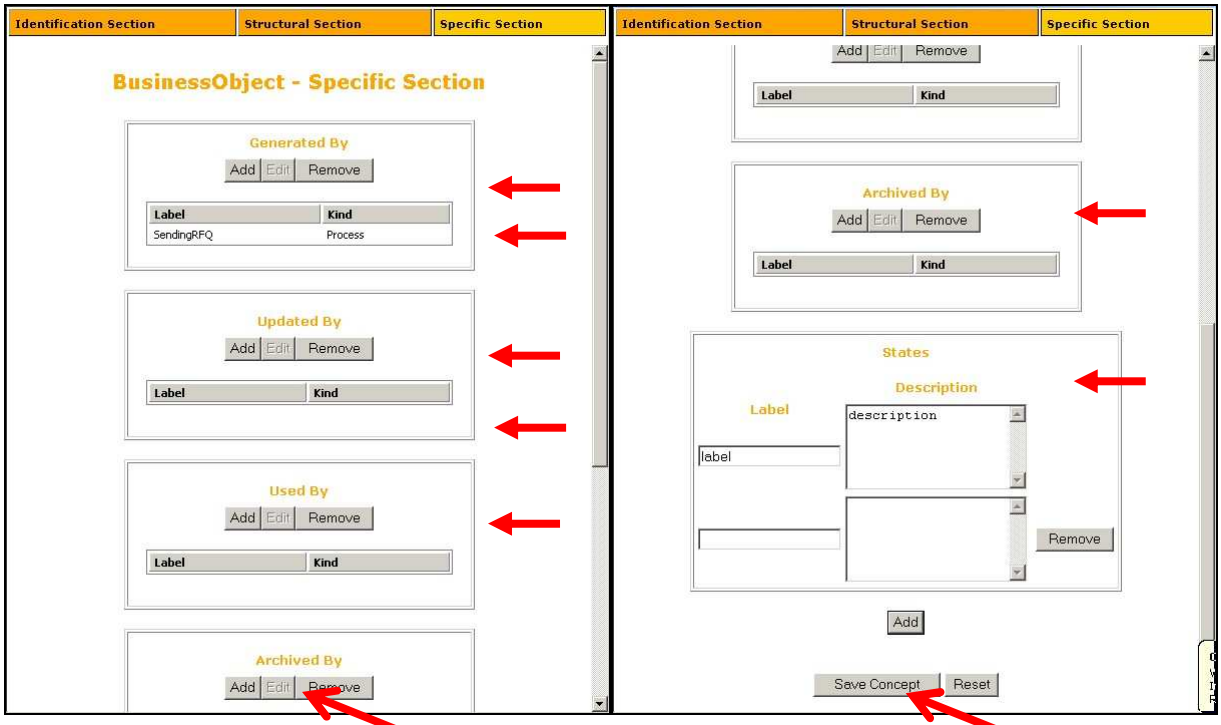

Figure 24 – Creation of a new concept - *Specific Section*

Each field (with self-explaining identification labels of identification and target buttons) may be used to define the information linked to the new concept (see the Introduction - Athos concepts organization).

In particular it is possible to **Add** (but also to edit or remove, because the same panel is used for these functions, as later explained) specific information concerning how the concept is used in the modelled scenario. As for the *Structural Section*, depending on the kind of concepts to be specified, the interface presents different fields to be filled. For instance, the user should fill the fields *GeneratedBy*, *UpdatedBy* or *States*, for *Object*, and *Goals*, *Skills*, *Responsibilities*, *Managed Objects*, *Collaboration* for *Actor*.

The process of filling the *Specific Section* is very similar to the one described for the *Structural Section* (see Fig. 23 -right). At the end of the data insertion on this panel the Ontology Master may:

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- click on the **Save Concept** button to save the new concept containing only the inserted definitions already built on (in case of a future editing to add further information);
- click on the **Reset** button to reset all the work done;
- click on one of the **Top bar** buttons, to select another pop-up window (either Identification or Structural) to add other inputs to the new concept.

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6.2 Example of creation of a new concept

To better clarify the *new concept creation process* through the Athos system a short example follows.

The Ontology Master decides to add to the ontology the new concept ***Delivery-Doc*** as a *BusinessOb ject*. First of all he/she has to select on the **New concept** row on the **Main** Button banner of the Menu Bar and open the "*Identification Section*" window (Fig. 25). Since **Delivery-Doc** is a "*BusinessObject"-kind* concept , the Ontology Master has to select "BusinessObject" from the Kind choice menu. Then using the panel facilities, he/she has to fill at least the "Label" and "Description" text fields as shown in the Fig.25.

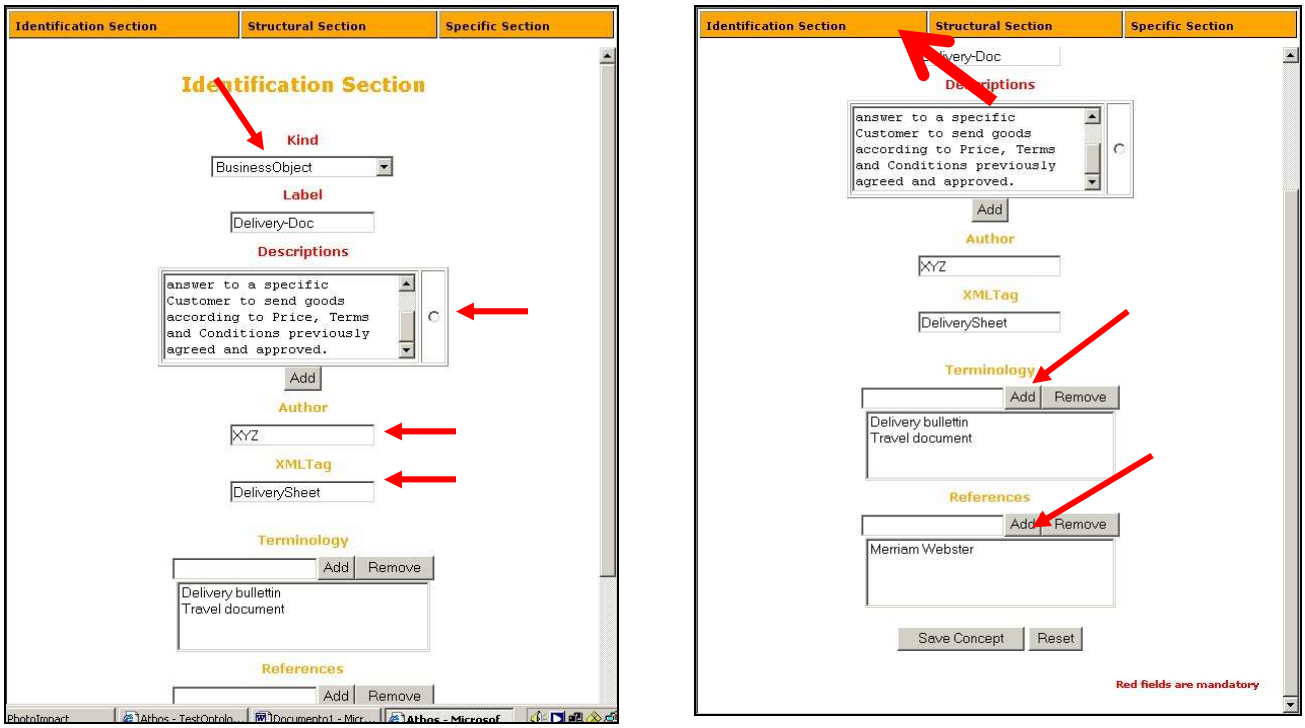

Figure 25- Creation of a new concept- Identification example

Once all the data have been checked, he/she moves to the *Structural Section* selecting the corresponding button on the top bar (remember that he/she may also decide to click on the **Save Concept,** saving only the Identification Section information, or to clear all by clicking on the **Reset** button).

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Moving to the *Structural Section* a different panel is shown. In this window (see Fig 26) he/she may add an Attribute to the concept by selecting an existing one from the ontology list (in this activity only the Atomic or Complex Attribute Kind concepts are displayed) or by defining a new label. In the latter case a Pending term is created. The concept is Pending until its definition will be completed.

In both alternatives, the Athos system supports user by opening a popup sub-panel (as shown in Fig 23).

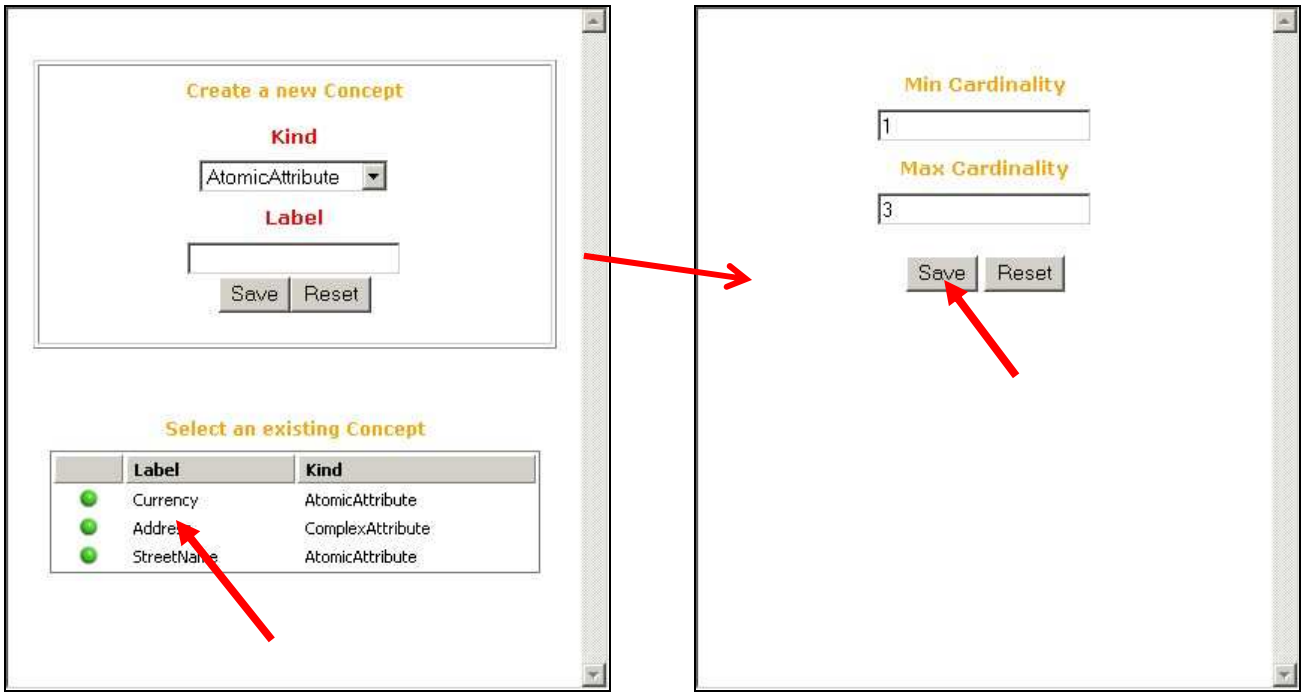

Figure 26- Creation of a new concept- Structural example

In the example the Ontology Master adds an attribute by selecting (Fig. 26 – left) the Complex Attribute "Address" from the ontology list. Then the system opens another popup window (Fig.26 – right) where the Ontology Master can define the cardinality values and save the attribute.

The defined attribute can be shown in the Attribute window in the *Structural Section* panel, (Fig.27).

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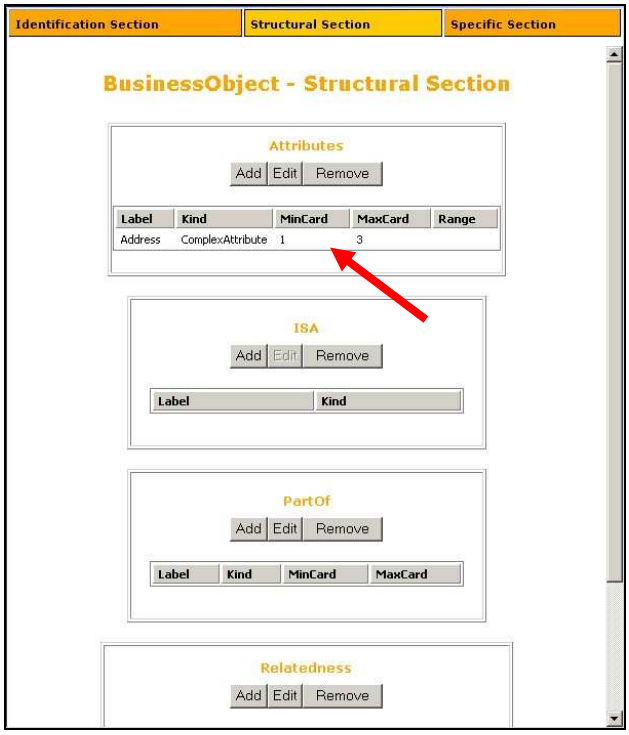

Figure 27- Creation of a new concept- Example of an Addition of an attribute

The process of defining Attributes is very similar to the process of correlating two concepts with relationships (e.g. ISA, Part-of, Relatedness).

In this example the *Specific Section* is not filled since this process is very similar to those described for the *Identification Section* and *Structural Section*.

Finally the Ontology Master saves the work done by clicking the **Save Concept** button. The system confirms this with a popup window that displays "**Your changes have been saved**", prompting him/her to terminate the operation with the **Close** button.

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The concept created is added in the Concept list. Fig.28 shows both the concept list and the *Identification Section* as displayed when Athos System is in the glossary mode.

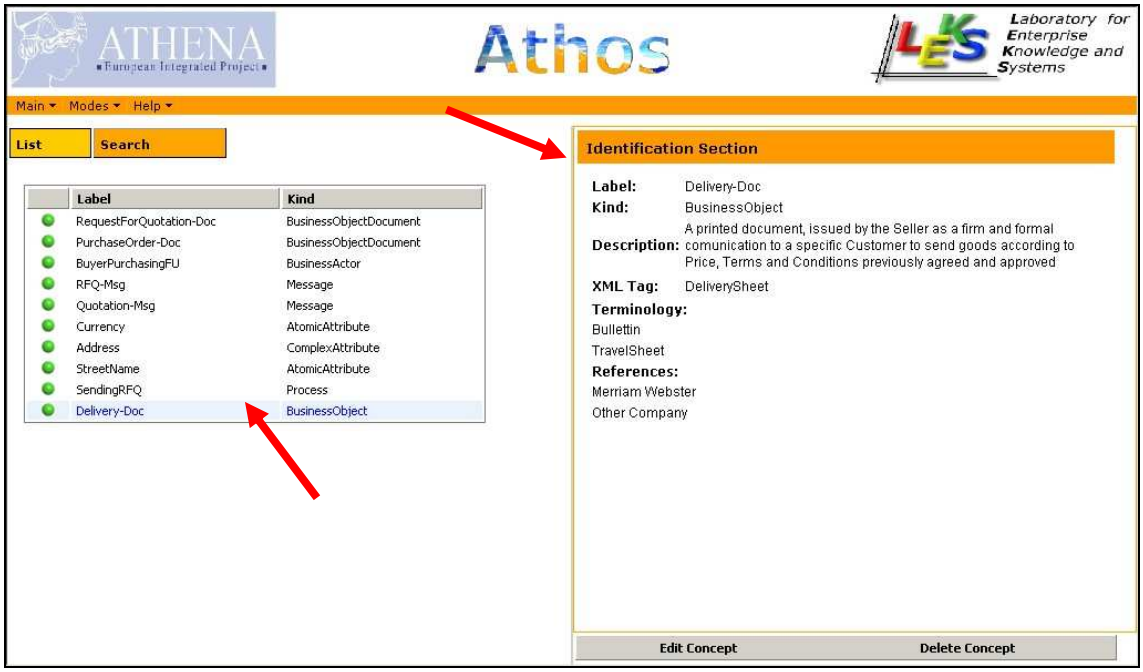

Figure 28- Creation of a new concept- Display of the inserted concept

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6.3 Editing an existing concept

To edit an existing concept, an **Ontology Master** has to select a concept from the *Concepts list* panel and then click on the **Edit Concept** button in the right panel (see Fig.28 above).

Once the **Edit Concept** button has been clicked the *Identification Section* popup window is opened **(**Fig.29)

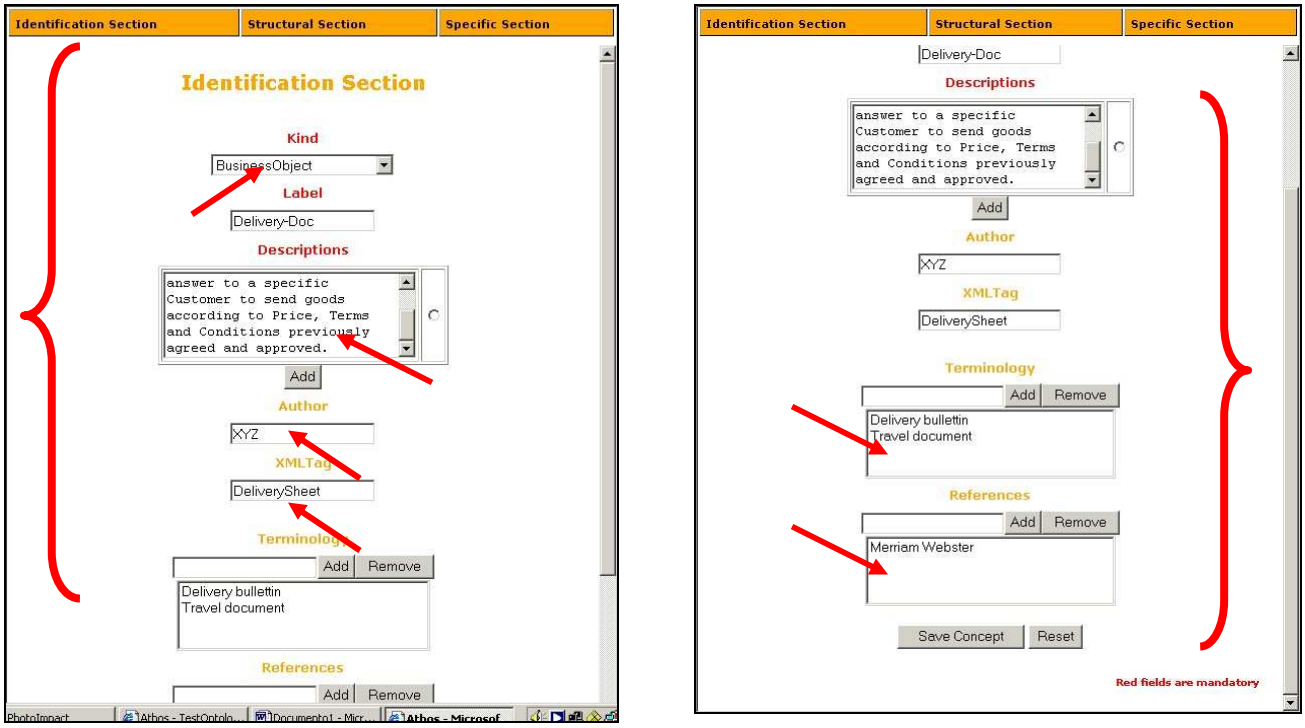

Figure 29 – Editing an existing concept

All the values of the different fields are displayed in the *Identification Section* (Fig.29). The panel allows the user to modify *Label*, *Descriptions*, *Author*, *XMLTag*, *Terminology*, *References*, whereas the *Kind* field is fixed.

Selecting the ***Structural Section*** label the system opens a different window in the same panel. In this window (see Fig 22) he/she may decide to change or add something to the concept, picking up existing concepts from the ontology list; this list displays only the concepts with the appropriate Kind, according to the OPAL constraints). The Ontology Master can also define new labels and,

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consequently, "pending terms". As previously said, a term is "pending" until it will be defined as a concept.

Successively, selecting the ***Specific Section*** **(**as already described - see Fig 24) the Ontology Master can modify the value of all the fields , with a process similar to that shown for the *Structural Section* via popup windows and data ties.

Finally, he can save (change) the edited concept by clicking on the **Save Concept** button. The system confirms the modifications with a po-up window that displays "**Your changes have been saved**", prompting him/her to terminate the operation with the **Close** button.. Otherwise he/she may cancel the modifications by clicking the **Reset** button.

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6.4 Deleting an existing concept

To remove a concept from the ontology, the **Ontology Master** has to select it from the Concept list and then click on the **Delete Concept** button in the right section.

Once the Delete Concept button has been activated, Athos prompts him/her to confirm the activity, by showing the **Delete confirm** window (Fig.30).

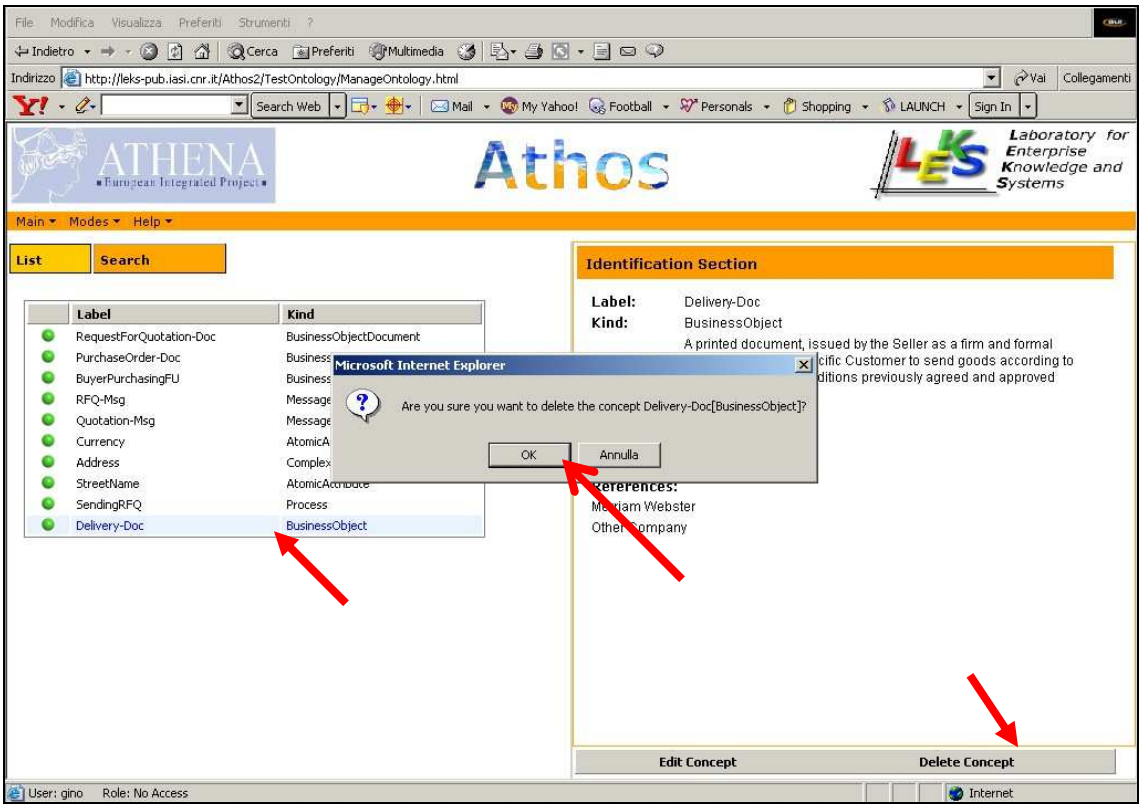

Figure 30 – Deletion of an existing concept

If the Ontology Master selects the **OK** button, the concept will deleted from the ontology, and all the relations with the other concepts are removed. Otherwise, if the user selects the **No** button, the concept will not be deleted from the ontology.

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6.5 Pending terms managementt

As previously clarified into this manual, in addition to the terms referring to concepts specified in the ontology, some terms, related to concepts not yet defined, are named **Pending terms**.

These pending terms are created during the definition process of new concepts to be added to the ontology and they are identified through any of the relations, built to connect to concepts not yet defined. These references are considered Pending terms, are automatically tagged Pending. They are included into the **Concept List** but are marked with a **Red dot.**.
To transform a Pending term into a concept, a Master has to Edit the term like a Concept and supply all the appropriate information, following the edit procedure.

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7. References

- [IDEF5] "IDEF5 Ontology Description Capture Method Overview"; http://www.idef.com/overviews/idef5.htm.
- [Usch96] M. Uschold, M. Gruninger; "Ontologies: Principles, Methods and Applications"; The Knowledge Engineering Review, V.11, N.2, 1996.

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